FIGURE 1A

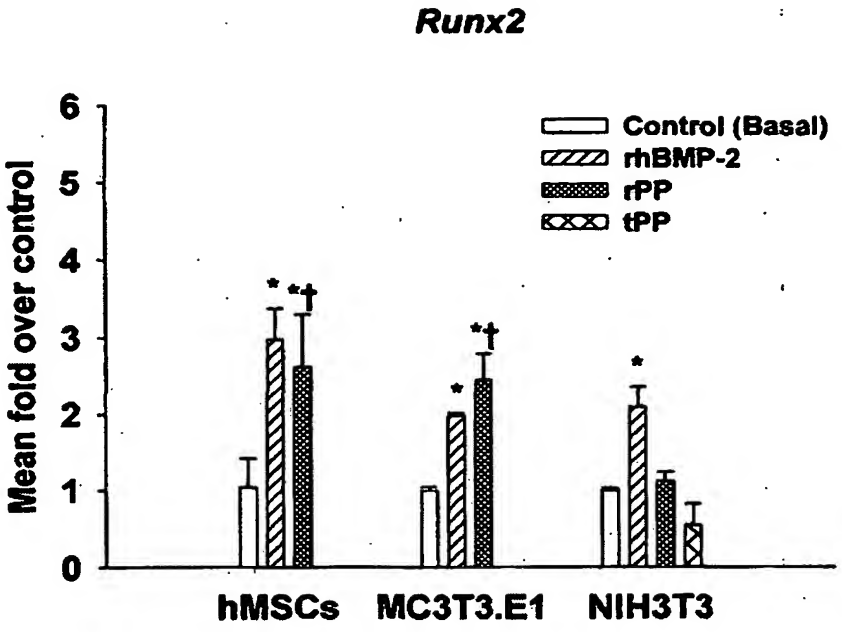



FIGURE 1B

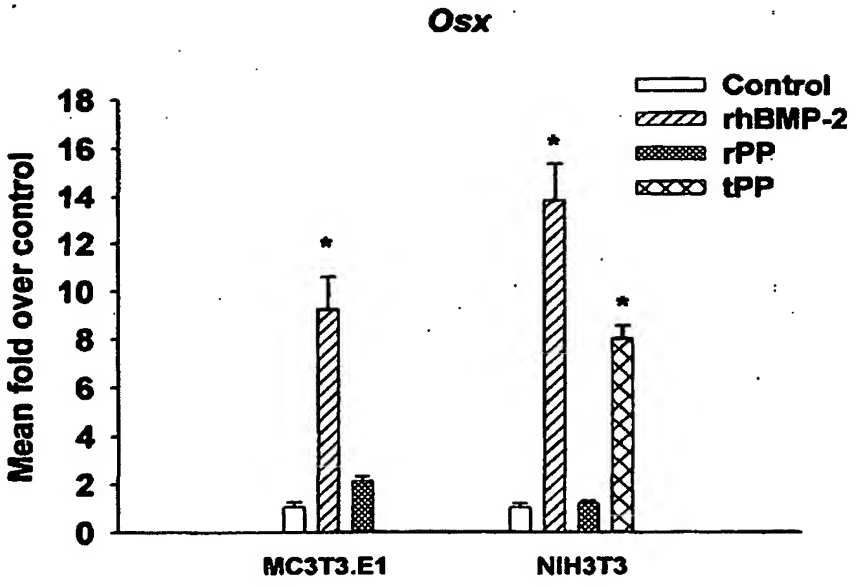


FIGURE 1C

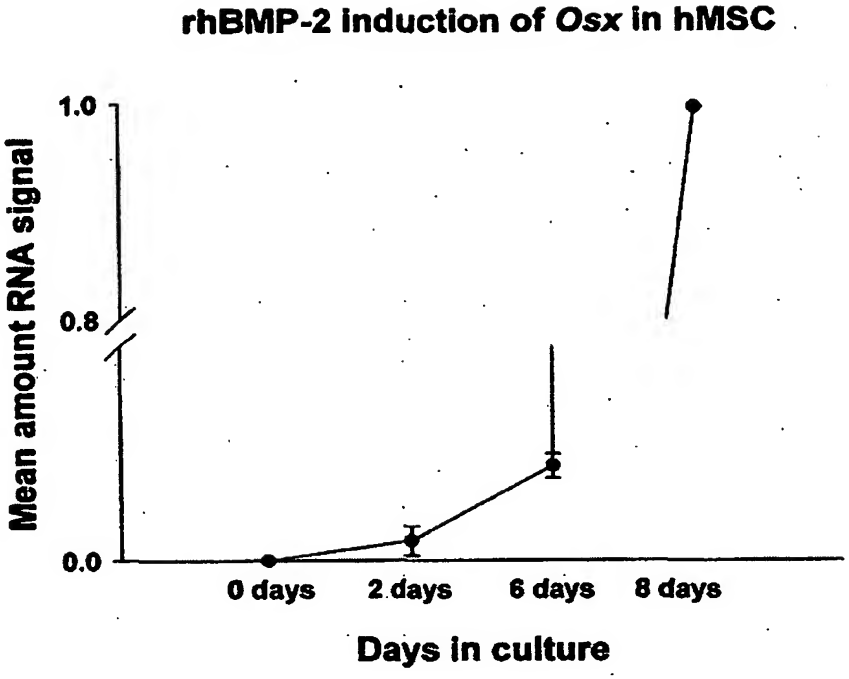



FIGURE 1D

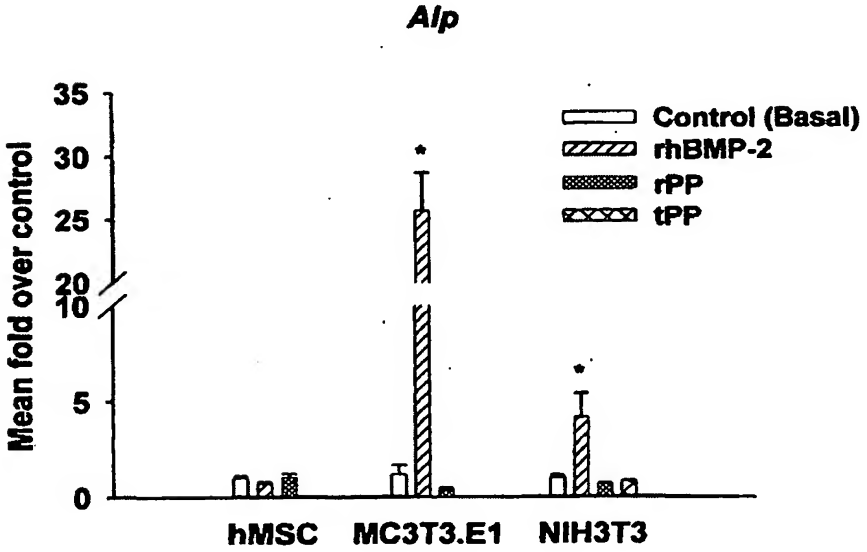


FIGURE 1E

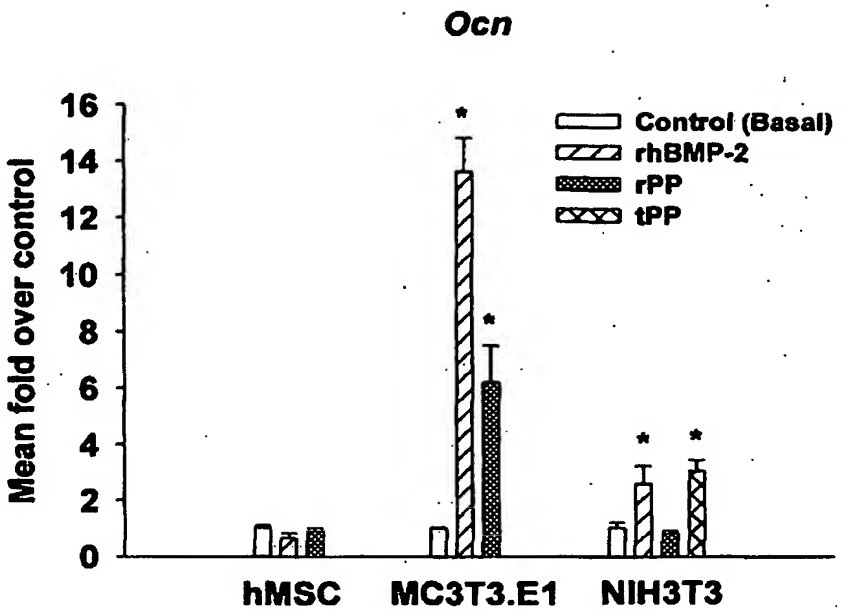



FIGURE 1F

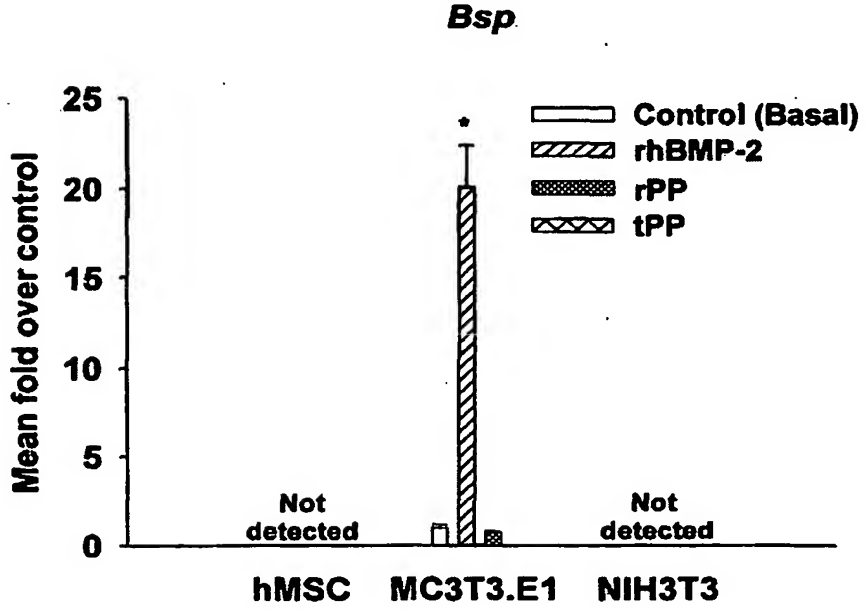


FIGURE 2A

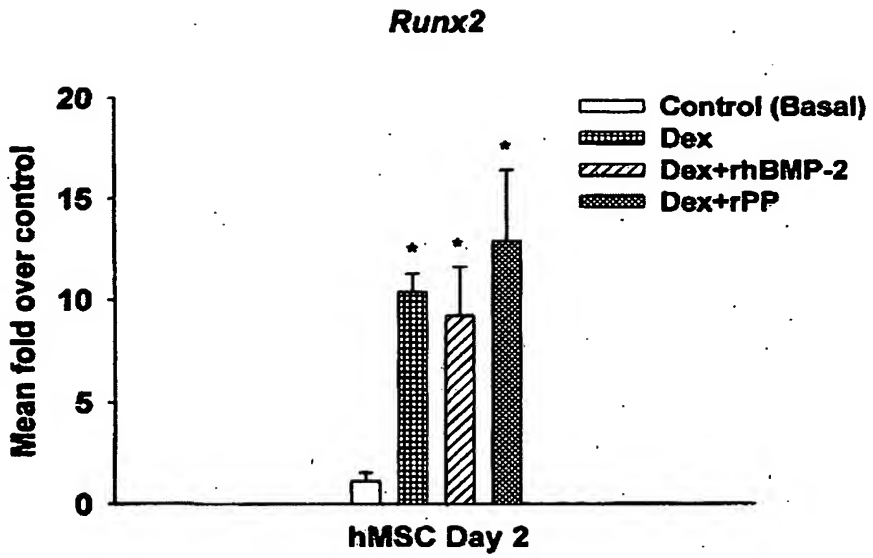



FIGURE 2B

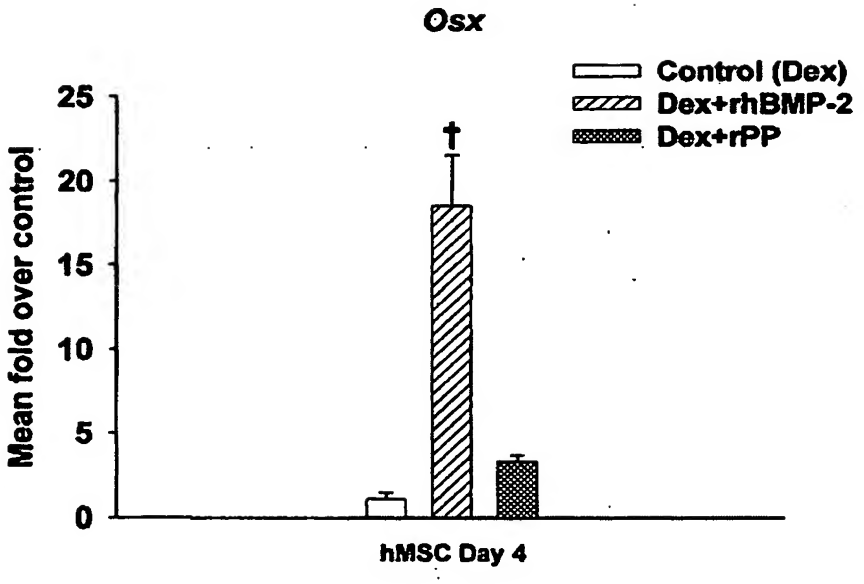


FIGURE 2C

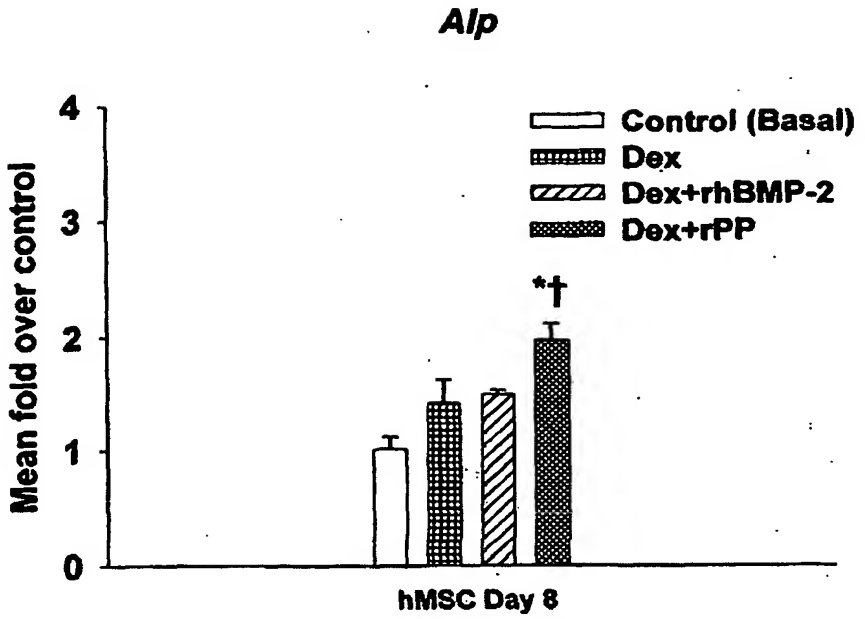



FIGURE 2D

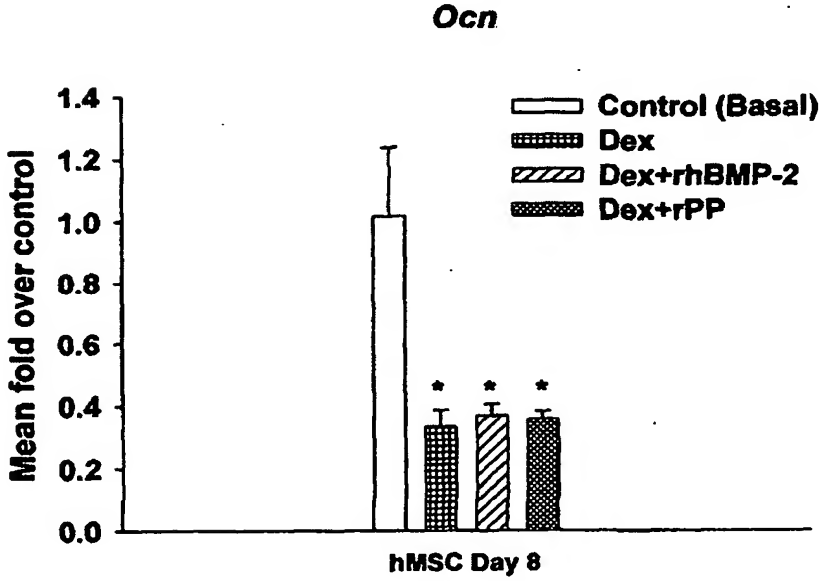


FIGURE 2E

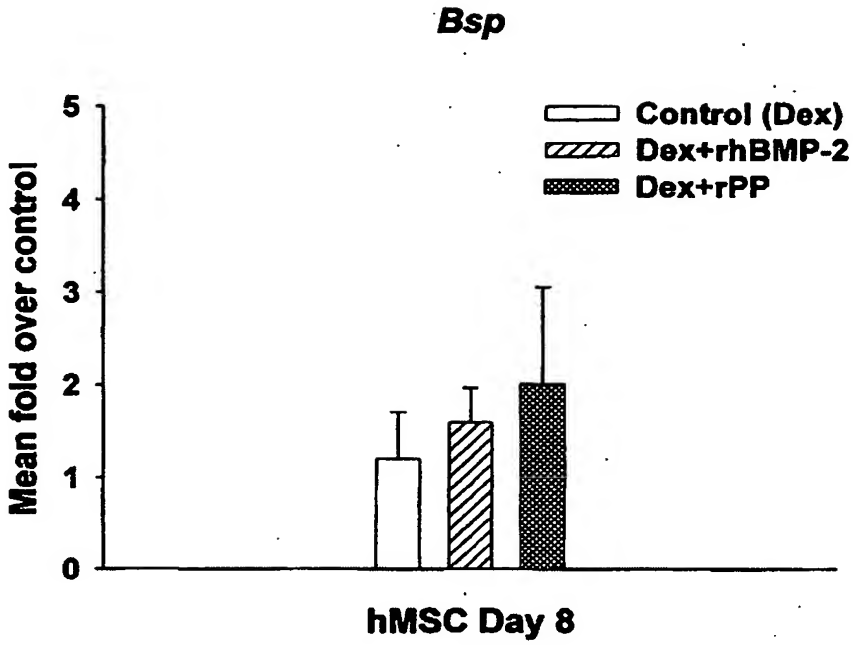

Bsp
Control (Dex)
Dex+rhBMP-2
Dex+rPP
Mean fold over control
0
1
2
3
4
5
hMSC Day 8

FIGURE 3

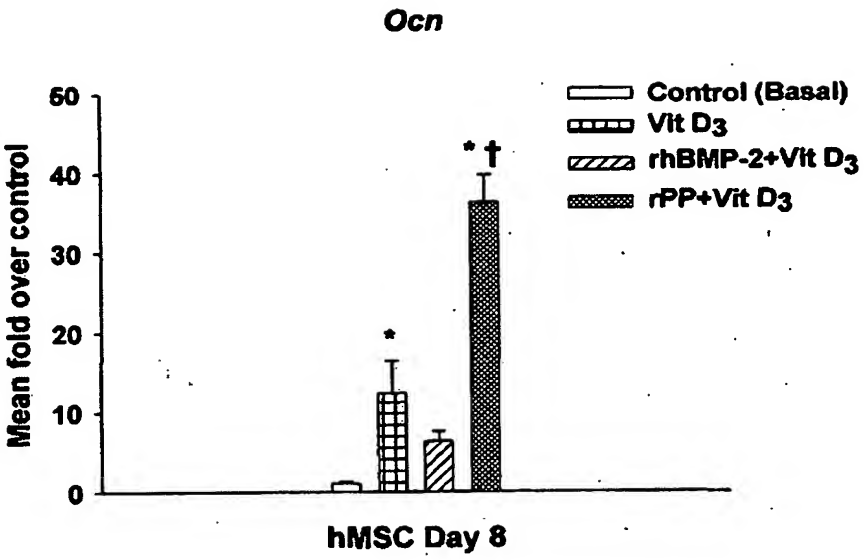

Ocn
Mean fold over control
60
40
30
20
10
0
*
* †
Control (Basal)
Vit D3
rhBMP-2+Vit D3
rPP+Vit D3
hMSC Day 8

FIGURE 4A

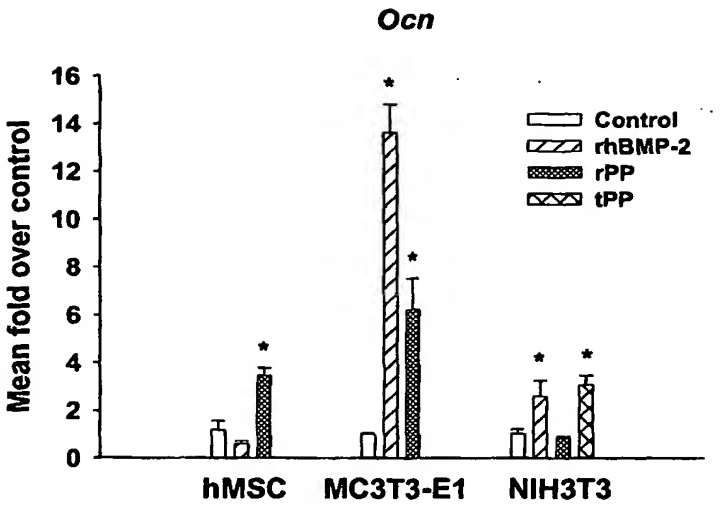



FIGURE 4B

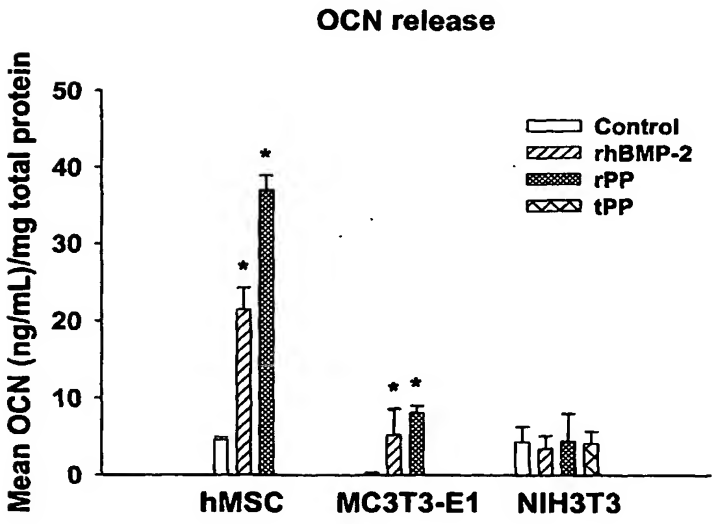


FIGURE 5

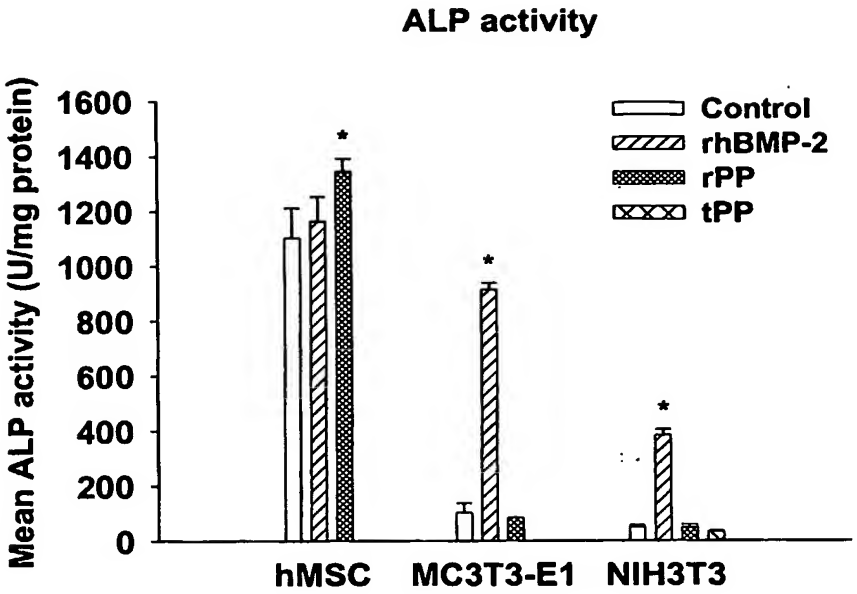

ALP activity
Mean ALP activity (U/mg protein)
1600
1400
1200
1000
800
600
400
200
0
Control
rhBMP-2
rPP
tPP
*
*
*
hMSC
MC3T3-E1
NIH3T3

FIGURE 6

FIGURE 6A

B)

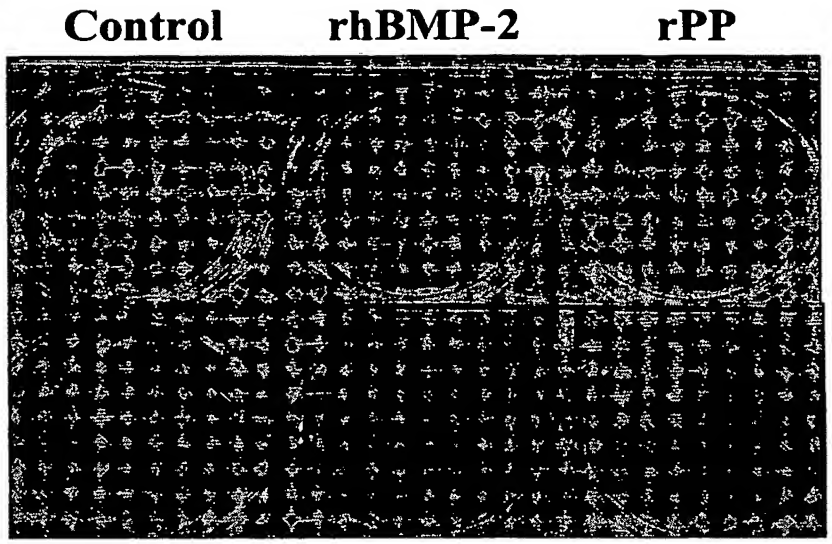



FIGURE 6B

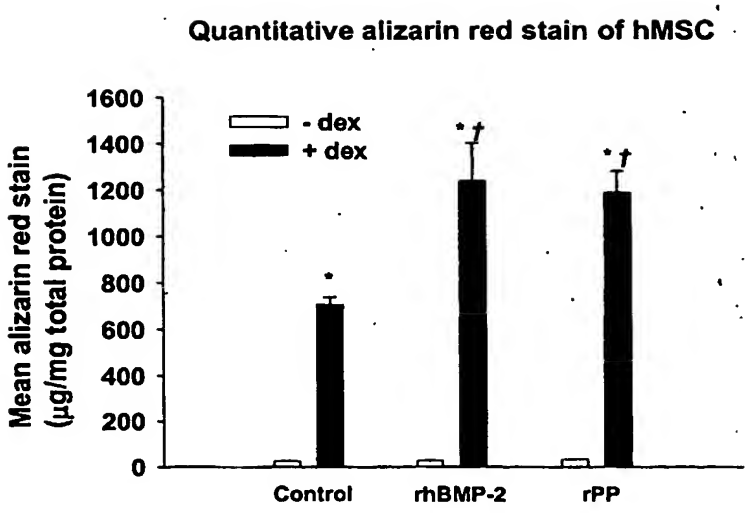


FIGURE 7

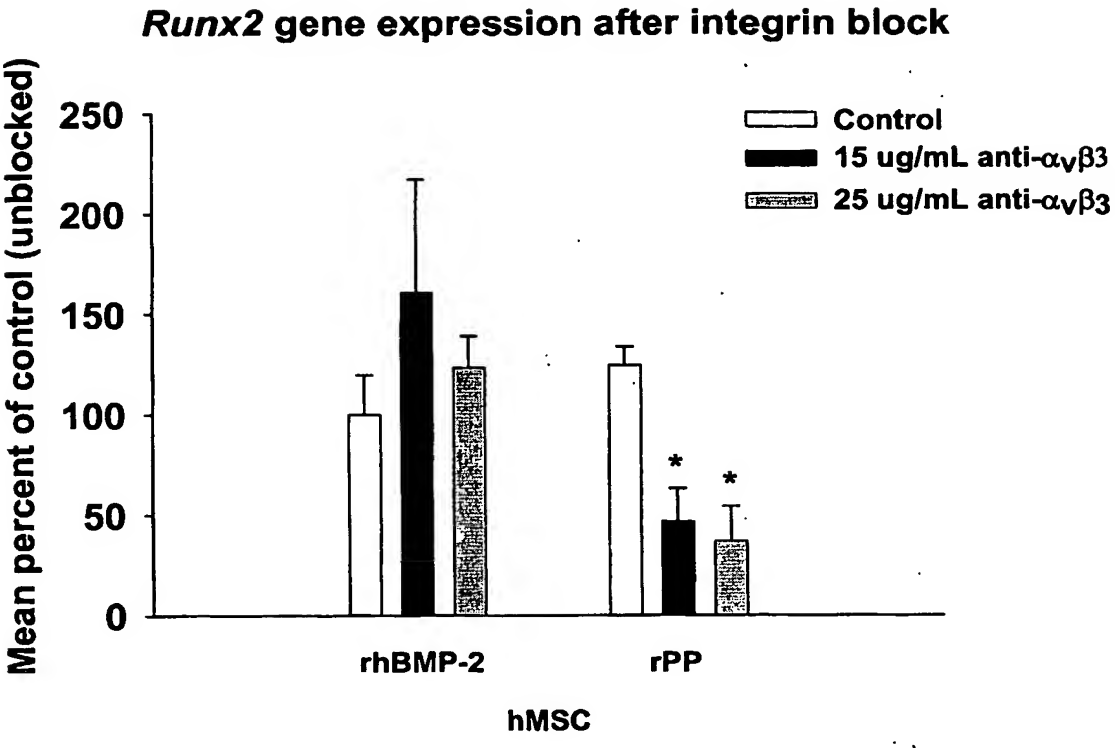

*Runx2* gene expression after integrin block
Mean percent of control (unblocked)
250
200
150
100
50
0
Control
15 ug/mL anti-αvβ3
25 ug/mL anti-αvβ3
*
*
rhBMP-2
rPP
hMSC

FIGURE 8

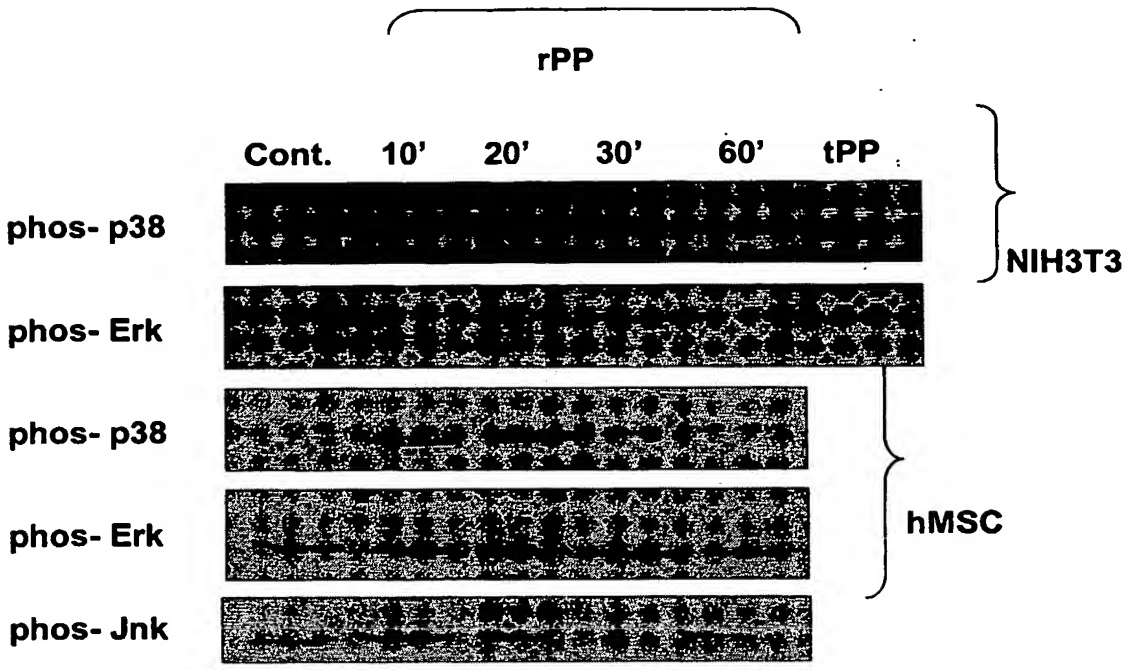

rPP
Cont.
10'
20'
30'
60'
tPP
phos- p38
phos- Erk
phos- p38
phos- Erk
phos- Jnk
NIH3T3
hMSC

**FIGURE 9**

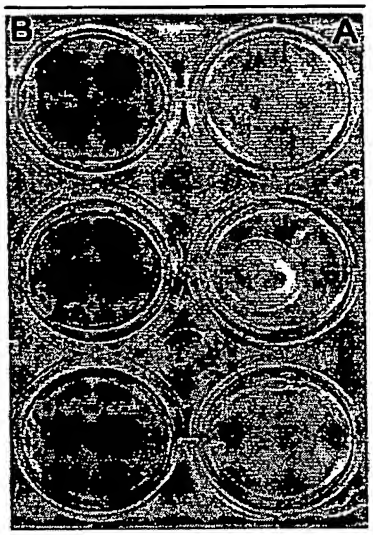


**FIGURE 10**

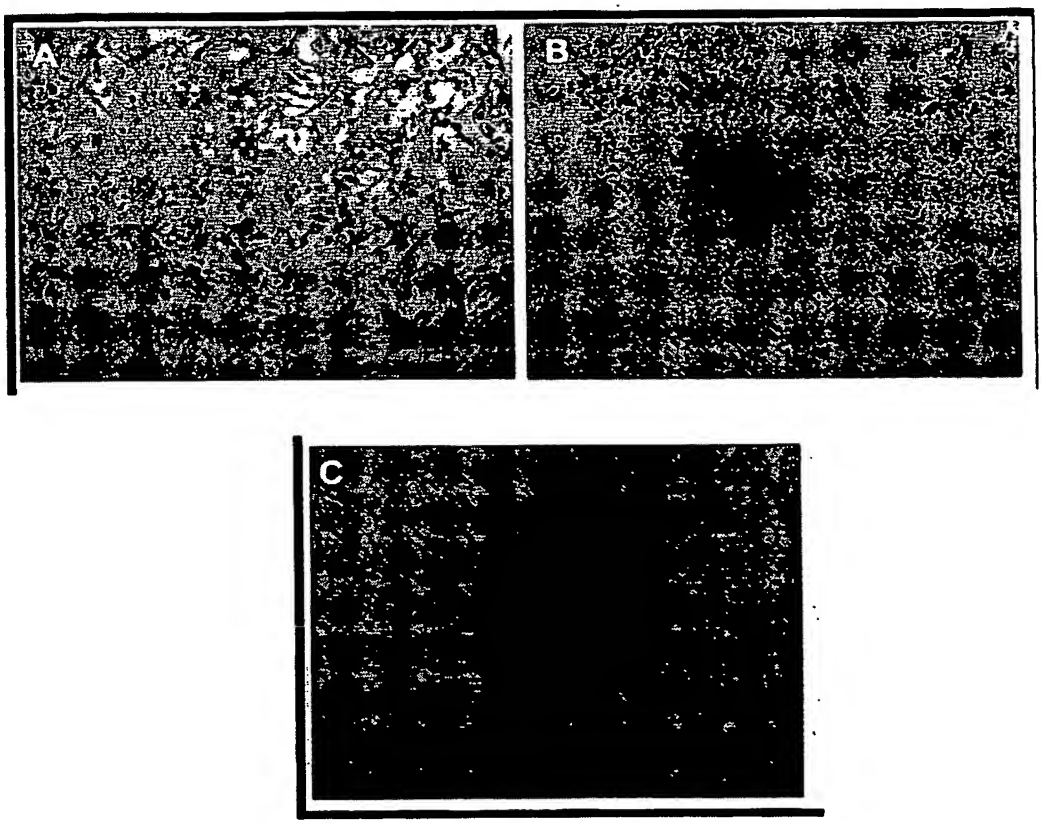


**FIGURE 11**

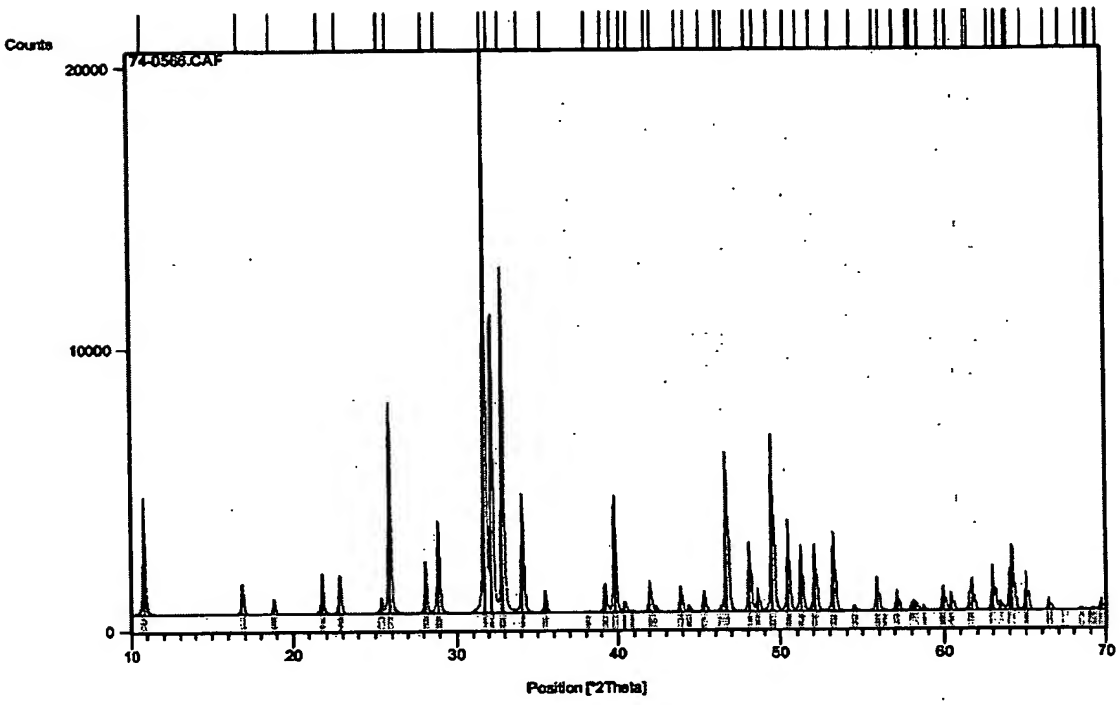

Counts
74-0568.CAF
20000
10000
0
10
20
30
40
50
60
70
Position [°2Theta]

**FIGURE 12**

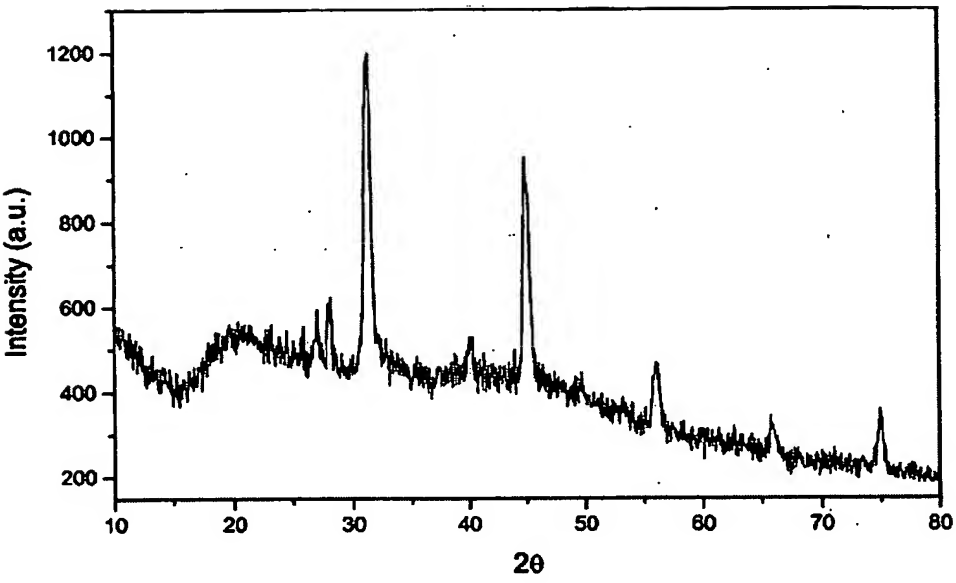
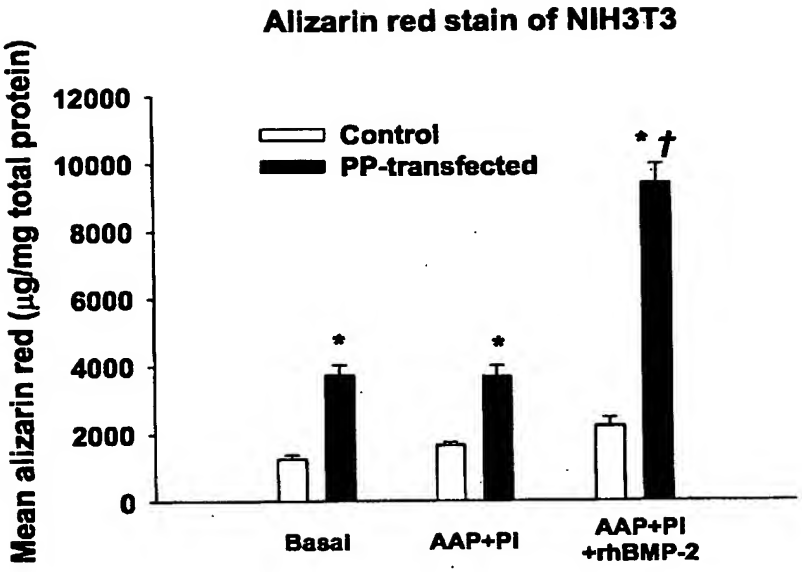
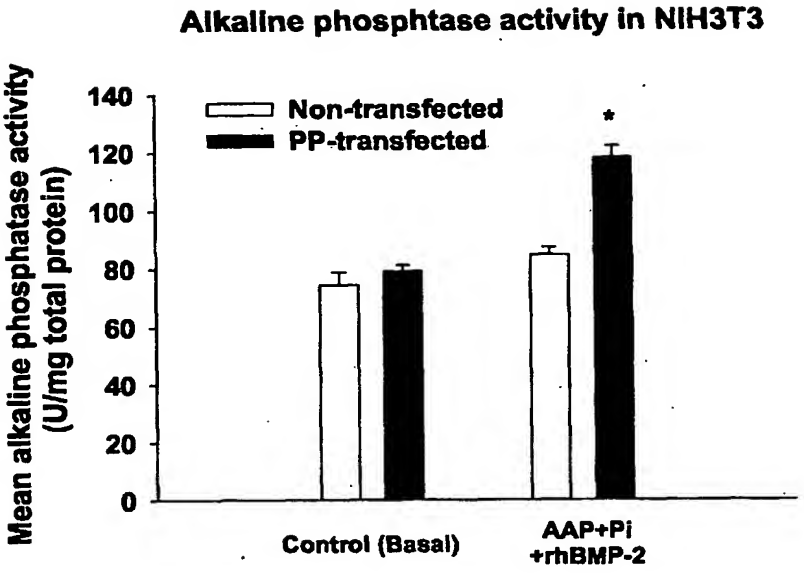


FIGURE 13



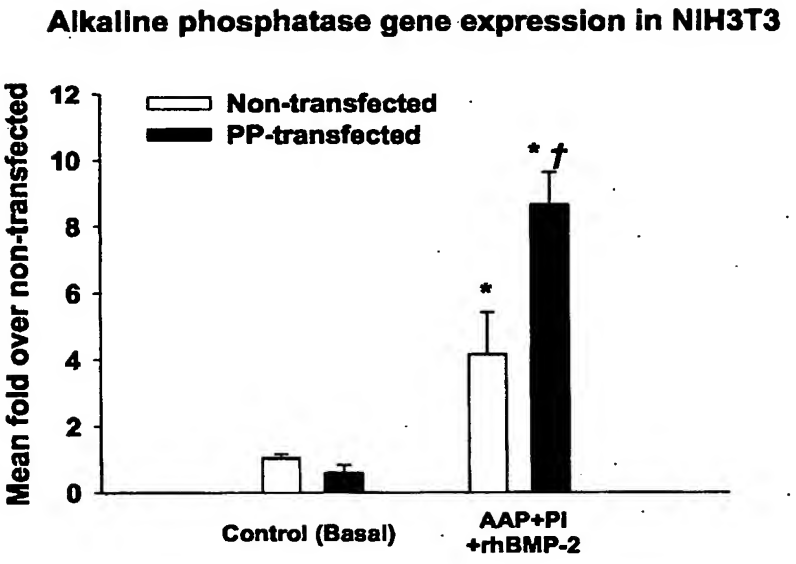

* Significant from control, p<0.05
† Significant from PP-transfected, AAP+Pi, p<0.05

FIGURE 14




* Significant from PP-transfected (Control) and non-transfected (AAP+PI+rhBMP-2), p<0.05

FIGURE 15




* Significant from Control (Basal), p<0.05
† Significant from non-transfected (AAP+PI+rhBMP-2), p<0.05

**FIGURE 16**

**SEQ ID NO:1**
**Amino acid sequence of full length *Mus musculus* PP protein (Exon 5 of DMP3)**

GIETEGPNKGNKSIITKESGKLSGSKDSNGHQGVELDKRNSPKQGESDKPQGTAEKS
AAHSNLGHSRIGSSSNSDGHDSYEFDDESMQGDDPKSSDESNGSDESDTNSESANES
GSRGDASYTSDESSDDDNDSDSHAGEDDSSDDSSGDGDSDSNGDGDSESEDKDES
DSSDHDNSSDSESKSDSSDSSDDSSDSSDSSDSSDSSDSSDSSDSSDSSDSSDSNSSSD
SSDSSGSSDSSDSSDTCDSSDSSDSSDSSDSSDSSDSSDSSDSSDSSDSSDSSSSSDSSD
SSSCSDSSDSSDSSDSSDSSDSSDSSSSDSSSSSNSSDSSDSSDSSSSSDSSDSSDSSDSS
DSSGSSDSSDSSASSDSSSSSDSSDSSSSSDSSDSSDSSDSSDSSESSDSSNSSDSSDSSD
SSDSSDSSDSSDSSDSSDSSNSSDSSDSSDSSDSSDSSNSSDSSDSSDSSDSSDSSDSSD
SSDSSDSSDSSDSSDSSDSSDSSDSSDSSDSSDSSDSSDSSDSSNSSDSSSDSDSKDS
SSDSSDGDSKSGNGNSDSNSDSNSDSDSDSEGSDSNHSTSDD

**SEQ ID NO: 2**
**Amino acid sequence of a portion of Exon 5 of the *Mus musculus* PP protein**

ESGSRGDASYTSDESSDDDNDSDSHAGEDDSSDDSSGDGDSDSNGDGDSESEDKDE
SDSSDHDNSSDSESKSDSSDSSDDSSDSSDSSDSSDSSDSSDSSDSSDSSDSSDSNSSS
DSSDSSGSSDSSDSSDTCDSSDSSDSSDSSDSSDSSDSSDSSDSSDSSDSSDSSSSSDSS
DSSSCSDSSDSSDSSDSSDSSDSSSSDSSSSSNSSDSSDSSDSSSSSDSSDSSDSSDS
SDSSGSSDSSDSSASSDSSSSSDSSDSSSSSDSSDSSDSSDSSDSSESSDSSNSSDSSDSS
DSSDSSDSSDSSDSSDSSDSSNSSDSSDSSDSSDSSDSSNSSDSSDSSDSSDSSDSSDSS
DSSDSSDSSDSSDSSDSSDSSDSSDSSDSSDSSDSSDSSDSSDSSNSSDSSDSDSK
DSSSDSSDGDSKSGNGNSDSNSDSNSDSDSDSEGSDSNHSTSDD

**SEQ ID NO: 3**
**Nucleotide sequence encoding full length *Mus musculus* PP protein (Exon 5 of DMP3)**

Ggaatagaaactgaaggtcccaacaaaggcaacaaaagtattattaccaaagaatctgggaaactcagtggaagtaaagatagca
atggacaccaaggagtggagctggacaaaaggaatagcccaaagcaaggggagtctgacaagcctcaaggcactgctgagaaa
tcagctgcccacagtaacctgggacacagcaggataggtagcagcagcaatagtgatgggcatgacagttacgagttcgatgacg
agtccatgcaaggagatgatcccaagagcagcgacgaatctaacggaagtgacgaaagtgacactaactctgaaagcgccaatga
gagtggcagccgtggagatgcttcttacacatctgatgaatcaagtgatgatgacaatgacagtgactcacatgcgggagaagacg
atagcagtgatgactcatctggtgatggtgacagtgacagtaatggtgatggtgacagcgagagtgaggacaaggacgaatctgac
agcagtgaccatgacaacagcagtgacagtgagagcaaatcagacagcagtgacagtagtgacgacagcagtgacagcagcga
cagtagtgacagcagtgacagcagtgacagtagtgacagtagtgacagcagcgacagcagtgacagcagcgacagcaacagta
gtagtgacagcagcgacagcagcggtagtagtgacagcagcgacagcagtgacacctgtgacagcagtgacagcagcgatagc
agtgacagcagtgacagcagtgacagcagcgatagcagtgacagcagtgacagtagtgacagcagtgacagcagcgacagcag
cagtagtagtgacagcagcgacagcagcagttgtagtgacagcagcgacagcagtgacagcagtgacagcagcgatagcagtg

acagcagtgacagcagcagcagcgacagcagcagcagtagcaacagcagtgacagtagtgacagcagtgacagcagcagcag
cagcgacagcagcgacagcagtgacagtagtgacagcagtgacagtagtggcagcagtgacagcagcgacagtagtgccagca
gcgacagcagcagtagtagtgacagcagcgacagcagtagtagtagtgacagcagtgacagtagtgacagtagtgacagcagtg
atagcagtgagagcagcgacagcagtaacagcagtgacagcagcgacagtagtgacagcagtgacagtagcgacagcagcga
cagtagtgacagtagcgacagcagtgacagtagcaacagtagcgacagcagtgacagcagtgacagcagcgacagtagtgaca
gcagcaacagtagtgacagcagtgacagtagcgacagtagtgacagcagtgacagcagtgacagcagcgacagtagtgacagc
agtgacagtagtgacagcagcgacagtagtgacagcagtgacagcagtgacagcagtgacagcagcgacagcagcgacagca
gtgacagcagcgacagcagcgacagcagtgacagcagcgacagcagcaacagcagtgacagcagtgacagtgacagcaagg
atagcagttctgacagcagtgatggtgacagcaagtctggtaatggcaacagtgacagcaacagtgacagcaacagtgacagtga
cagtgacagtgaaggcagtgacagtaaccactcaaccagtgatgattag

**SEQ ID NO:4**
**Nucleotide sequence encoding a portion of Exon 5 of the *Mus musculus* PP protein**

gagagtggcagccgtggagatgcttcttacacatctgatgaatcaagtgatgatgacaatgacagtgactcacatgcgggagaaga
cgatagcagtgatgactcatctggtgatggtgacagtgacagtaatggtgatggtgacagcgagagtgaggacaaggacgaatctg
acagcagtgaccatgacaacagcagtgacagtgagagcaaatcagacagcagtgacagtagtgacgacagcagtgacagcagc
gacagtagtgacagcagtgacagcagtgacagtagtgacagtagtgacagcagcgacagcagtgacagcagcgacagcaacag
tagtagtgacagcagcgacagcagcggtagtagtgacagcagcgacagcagtgacacctgtgacagcagtgacagcagcgata
gcagtgacagcagtgacagcagtgacagcagcgatagcagtgacagcagtgacagtagtgacagcagtgacagcagcgacagc
agcagtagtagtgacagcagcgacagcagcagttgtagtgacagcagcgacagcagtgacagcagtgacagcagcgatagcag
tgacagcagtgacagcagcagcagcgacagcagcagcagtagcaacagcagtgacagtagtgacagcagtgacagcagcagc
agcagcgacagcagcgacagcagtgacagtagtgacagcagtgacagtagtggcagcagtgacagcagcgacagtagtgccag
cagcgacagcagcagtagtagtgacagcagcgacagcagtagtagtagtgacagcagtgacagtagtgacagtagtgacagcag
tgatagcagtgagagcagcgacagcagtaacagcagtgacagcagcgacagtagtgacagcagtgacagtagcgacagcagcg
acagtagtgacagtagcgacagcagtgacagtagcaacagtagcgacagcagtgacagcagtgacagcagcgacagtagtgac
agcagcaacagtagtgacagcagtgacagtagcgacagtagtgacagcagtgacagcagtgacagcagcgacagtagtgacag
cagtgacagtagtgacagcagcgacagtagtgacagcagtgacagcagtgacagcagtgacagcagcgacagcagcgacagc
agtgacagcagcgacagcagcgacagcagtgacagcagcgacagcagcaacagcagtgacagcagtgacagtgacagcaag
gatagcagttctgacagcagtgatggtgacagcaagtctggtaatggcaacagtgacagcaacagtgacagcaacagtgacagtg
acagtgacagtgaaggcagtgacagtaaccactcaaccagtgatgattag

**SEQ ID NO: 5**
**Amino acid sequence of *Mus musculus* DMP3 protein**
**GenBank Accession No. AAD42781**

```
1     mkmkiiiyic iwatawaipv pqlvplerdi vensvavpll thpgtaaqne lsinsttsns
61    ndspdgseig eqvlsedgyk rdgngsesih vggkdfptqp ilvneqgnta eehndietyg
121   hdgvhargen stangirsqv givenaeeae ssvhgqagqn tksggasdvs qngdatlvqe
181   neppeasikn stnheagihg sgvathettp qreglgsenq gtevtpsige daglddtdgs
241   psgngveede dtgsgdgega eagdgreshd gtkgqgggqsh ggntdhrgqs svstedddsk
301   eqegfpnghn gdnsseengv eegdstqatq dkeklspkdt rdaeggiisq seacpsgksq
361   gietegpnkg nksiitkesg klsgskdsng hqgveldkrn spkqgesdkp qgtaeksaah
421   snlghsrigs ssnsdghdsy efddesmqgd dpkssdesng sdesdtnses anesgsrgda
481   sytsdessdd dndsdshage ddssddssgd gdsdsngdgd sesedkdesd ssdhdnssds
541   esksdssdss ddssdssdss dssdssdssd ssdssdssds sdsnsssdss dssgssdssd
```

```
601   ssdtcdssds sdssdssdss dssdssdssd ssdssdssds ssssdssdss scsdssdssd
661   ssdssdssds sdssssdsss ssnssdssds sdsssssdss dssdssdssd ssgssdssds
721   sassdsssss dssdsssssd ssdssdssds sdssessdss nssdssdssd ssdssdssds
781   sdssdssdss nssdssdssd ssdssdssns sdssdssdss dssdssdssd ssdssdssds
841   sdssdssdss dssdssdssd ssdssdssds sdssdssnss dssdsdskds ssdssdgdsk
901   sgngnsdsns dsnsdsdsds egsdsnhsts dd
```

**SEQ ID NO: 6**
**Nucleotide sequence of *Mus musculus* DMP3**
**GenBank Accession No. AP 135799**

```
1 gaattctttt cccattggta acgtaaaaga ccactactta attgagttag cttaggctca
61 acaaacagac tttatacaac ttaacttcct tcacatttat gaaaaattaa tcagtatcgg
121 cactgagaag gcagaaacag gtagaactcc atgagtttca ggccagcctg atctacatag
181 gaattctagg acaagcaggg ctaggtagag ataccctatc tcaaaaaacc aaaacccaaa
241 aacattacgt ttaagcagat ttagttttga ccctaaatgt ttgtcttagt gaaggtccca
301 aatgctctta gcaaatgttt ctttgtgtag ttggagagtg ttgtgtgcta atacagctat
361 caagcacttc tgtttagaca ccgaagatct tcttaactct ccatcaggtc tggagagctg
421 ttcaaatctg ctattacaac caagttagga agaggaaggc aattcctgag gaaagtggca
481 ttcttaaata tgattggccc tttaagatgc tcaaagaacc aagaaccatg cagtgtaaat
541 aatagcaaag tgtttactat ggaagtgcag cttcgaggaa actcccttcc tatcactgga
601 acctgtccaa tccctaccta catgaatatg ttgtttaatt ctctcagtat aaagctctga
661 agatgctgtt gctggatagt gatttaatat ttctgatcat atgtgtttga catctttcag
721 tagtgtgaca taaaaacatg gacacatccc taagctggta cacagagact ccaattgcct
781 agtgtggagc tcataagcta gagaaatggc tcagggatca tcttgtatat ccagggctcg
841 agagaatgat gggttcaggc aagtactttt tcctttctgg aagcacagcc tgttttccta
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14641 agagcttggc atgaccaggc tttcattatg gcaagctagt cactgggcaa agagaatgtt
14701 ctaacttcat ttgcagacag aatgctcttc aaaatggaga aaatttggat gcaggcaaag
14761 tcgactgcca agccctgcca agacagggta agaatatcct tcatagttcc tgctccacaa
14821 acatgcctgt cagatatact ggggcagagg cctgaagaca gatgttccag tgttatagag
14881 aattttgggg attctccagt cagctagatg cttgccaatt ctatagtttt ggaagctgct
14941 tgcctacact tcctacaaac tcagttaatt atcccttccc aagtctctga tggggttgaa
15001 gattatatag tcatagtctc acaatgaaac ataacaaaga atctaagaaa gtgctttagg
15061 gtctaaggag gtgttttaag gttggtaaat gaagatcata ggattagatg gtgttttatg
15121 aaggttggag gaaattgtaa atgggtgttt taggttggta aatgcaaatt atgaaagtta
15181 gaggatttaa atgcttaaga tggtaatgga aaaagtaatt taaatacaga actctgaact
15241 caccaagatt caatagataa aaaatatctt ctcctaagtt gccaaataca gatggactgg
15301 acattgtgaa tatatttatt acccatggat ttcataattg ctcttactga tatagttcct
15361 tattgtaaga gaaagatcct tttttattta gacaaaaaag gggaaatgtt ggggttggtc
15421 tggtgctgct gtgtactcaa atactaaata ctgggtccca agatctgatt gctctcaatg
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15541 cgataaaagg ctaaagtctg ggattgggca gtagagagag aaaggtggaa gacttgagga
15601 tcaaatgagg gtgtctcagg agagatcagg ggaggagata agaaggaagt gacaaagaga
15661 ggaggagggt gccatgagag gagatggatc atgagcacat ggccaggaga aacagcaact
15721 gacaagggac atatggctgg gatataagtt acaatagctc aaaaagttgc ccaatatagg
15781 cttacagctt ataaataaaa taccagaatc atgcatcttt aatgtggctt agctagaata
15841 tgtaattcct tttataccac tgggcttaga atgtcacccc cagtgacaca cttcctccaa
15901 aaggccacat atcctaatcc ttctcaagta gtgccacttt ctgatgacta agtattaatg

```
15961 tattggggcc attcttatcc aaactaccac agtcataata catctagcag gttcttagaa
16021 agctttctcc ctaaagagta tttttatgag gttagatgct ttaggaccta gcattatact
16081 ggaactcatg aaggaagatt atgaccttgt ttttcttgta taaccattta tatctgaatt
16141 tggaatttca gggcaaaaat ggaggagaca caattaaaaa tgtctcaagg ttcaatcctt
16201 tgaatgccag aaaagtatta ttagggaaaa ccttacgtta tttaccagaa taaagattaa
16261 taagcaattt cctcatactg ttcatcaggg caatggtgtt taggttctat ttctaatgac
16321 atgtctcttt gttagggaat tcccatgagc actcaggtgt tcatggagac cagaagagga
16381 tgtcagatct cctggagctg gagtgaagcc acttgtaagc tgcctgatgt ggatgctgga
16441 aatcaaactt gaaaccttta ttagccctta tactcttaat tgctgagtca tctctccagt
16501 ttctgacagc agtgttccct aaatcccagg ttgctaatca actagtcact tattataatt
16561 atatcaattt aatgagttac aaaaatactt aagatgaaag agtaaggtaa aatcataaca
16621 gtgtgttgtg aaactatata catatacata ttgtcttagt taggatttac tgtgggaaca
16681 gacaccatga ccaatacaag tcttataaag ggtaacattt aattgagata gcttacaggt
16741 tcagaggttc agtccattat catcaaggca tggcagcatc caggtaggca tggtgcaaga
16801 ggactgagag ttctacatct tcacctgaag gttgctagaa gaatactgac ttccaggtag
16861 ctaggatgag ggtcttaaag cctacaccca catttacaca cctactccaa caagactata
16921 ccaactccaa cagggtcaca ccctctaata gtgccactcc cttgggctga gcatatgcaa
16981 accatcacac acagatatgt tgaagtgcgc ctatgctaga gatgcatgca atgtcttttt
17041 aactgttggt tgtggttagg aaaattagag aaccattggt ttaggaagac attactgccc
17101 tggtaatttg atactgattt tcaacattca cctttctcct tacaaacctc taacttgctt
17161 gcccaacttt gaagatggaa aatttaaaag aaagcacaag aaatattggg ggtgtatctg
17221 aatgggtaga agggatcga
```

**SEQ ID NO:7**
**Amino acid sequence of human phosphophoryn**
**GenBank Accession No. NP_055023**

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    1 mkiityfciw avawaipvpq skplerhvek smnlhllars nvsvqdelna sgtikesgvl
   61 vhegdrgrqe ntqdghkgeg ngskwaevgg ksfstystla neegniegwn gdtgkaetyg
  121 hdgihgkeen itangiqgqv siidnagatn rsntngntdk ntqngdvgda ghnedvavvq
  181 edgpqvagsn nstdnedeii enscrnegnt seitpqinsk rngtkeaevt pgtgedagld
  241 nsdgspsgng adededegsg ddedeeagng kdssnnskgq egqdhgkedd hdssigqnsd
  301 skeyydpegk edphnevdgd ktskseensa gipedngsqr iedtqklnhr eskrvenrit
  361 kesethavgk sqdkgieikg pssgnrnitk evgkgnegke dkgqhgmilg kgnvktqgev
  421 vniegpgqks epgnkvghsn tgsdsnsdgy dsydfddksm qgddpnssde sngnddanse
  481 sdnnsssrgd asynsdeskd ngngsdskga edddsdstsd tnnsdsngng nngnddndks
  541 dsgkgksdss dsdssdssns sdssdssdsd ssdsnsssds dssdsdssds sdsdssdssn
  601 ssdssdssds sdssdssdss dsksdsskse sdssdsdsks dssdsnssds sdnsdssdss
  661 nssnssdssd ssdssdssss sdsssssdss nssdssdssd ssnssessds sdssdsdssd
  721 ssdssnsnss dsdssnssds sdssdssdss nssdssdssd ssnssdssds sdssdssdss
  781 nssdsndssn ssdssdssns sdssnssdss dssdssdsds snssdssnss dssdssnssd
  841 ssdssdssds sdsdssnrsd ssnssdssds sdssnssdss dssdssdsne ssnssdssds
  901 snssdsdssd ssnssdssds snssdssess nssdnsnssd ssnssdssds sdssnssdss
  961 nsgdssnssd ssdsnssdss dssnssdssd ssdssdssds sdssnssdss dssdssdssn
 1021 ssdssnssds sdssdssdss dssdssnssd ssdssdssds sdssgssdss dssdssdssd
 1081 ssdssdssds sdssessdss dssdssdssd ssdssdssds sdssdssdss nssdssdssd
 1141 ssdssdssds sdssdssdss dssdssdssd ssdssdssds sdsnessdss dssdssdssn
 1201 ssdssdssds sdstsdsnde sdsqsksgng nnngsdsdsd segsdsnhst sdd
```

**SEQ ID NO:8**
**Nucleotide sequence of human phosphophoryn**
**GenBank Accession No. NM_014208**

```
   1 atgcaaaagt ccaggacagt gggccacttt cagtcttcaa agagaaagat aagaaattct
  61 ggattttcaa aatccttttg aagcctttta agccattgat tattattatt cctaaagaaa
 121 atgaagataa ttacatattt ttgcatttgg gcagtagcat gggccattcc agttcctcaa
 181 agcaaaccac tggagagaca tgtcgaaaaa tccatgaatt tgcatctcct agcaagatca
 241 aatgtgtcag tacaggatga gttaaatgcc agtggaacca tcaaagaaag tggtgtcctg
 301 gtgcatgaag gtgatagagg aaggcaagag aatacccaag atggtcacaa gggagaaggg
 361 aatggctcta agtgggcaga agtaggaggg aagagttttt ctacatattc cacattagca
 421 aacgaagagg ggaatattga gggctggaat ggggacacag gaaaagcaga aacatatggt
 481 catgatggaa tacatgggaa agaagaaaac atcacagcaa atggcatcca gggacaagta
 541 agcatcattg acaatgctgg agccacaaac agaagcaaca ctaatggaaa tactgataag
 601 aatacccaaa atggggatgt tggcgatgca ggtcacaatg aggatgtcgc tgttgtccaa
 661 gaagatggac ctcaagtagc tggaagcaat aacagtacag acaatgagga tgaaataatt
 721 gagaattcct gtagaaacga gggtaataca agtgaaataa cacctcagat caacagcaag
 781 agaaatggga ctaaggaagc tgaggtaaca ccaggcactg gagaagatgc tggcctggat
 841 aattccgatg ggagtcctag tgggaatgga gcagatgagg atgaagacga gggttctggt
 901 gatgatgaag atgaagaagc agggaatgga aaagacagta gtaataacag caagggccag
 961 gagggccagg accatgggaa agaagatgat catgatagta gcataggtca aaattcggat
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1081 aagacctcca agagtgagga gaattctgct ggtattccag aagacaatgg cagccaaaga
1141 atagaggaca cccagaagct caaccataga gaaagcaaac gcgtagaaaa tagaatcacc
1201 aaagaatcag agacacatgc tgttgggaag agccaagata agggaataga aatcaagggt
1261 cccagcagtg gcaacagaaa tattaccaaa gaagttggga aaggcaacga aggtaaagag
1321 gataaaggac aacatggaat gatcttgggc aaaggcaatg tcaagacaca aggagaggtt
1381 gtcaacatag aaggacctgg ccaaaaatca gaaccaggaa ataaagttgg acacagcaat
1441 acaggtagtg acagcaatag tgatggatat gacagttatg attttgatga taagtccatg
1501 caaggagatg atcccaatag cagtgatgaa tctaatggca atgatgatgc taattcagaa
1561 agtgacaata acagcagtag ccgaggagat gcttcttata actctgatga atcaaaagat
1621 aatggcaatg gcagtgactc aaaaggagca gaagatgatg acagtgatag cacatcagac
1681 actaataata gtgacagtaa tggcaatggt aacaatggga atgatgacaa tgacaaatca
1741 gacagtggca aaggtaaatc agatagcagt gacagtgata gtagtgatag cagcaatagc
1801 agtgatagta gtgacagcag tgacagtgac agcagtgata gcaacagtag cagtgatagt
1861 gacagcagtg acagtgacag cagtgatagc agtgacagtg atagtagtga tagcagcaat
1921 agcagtgaca gtagtgacag cagtgatagc agtgacagta gtgatagtag tgacagcagt
1981 gacagcaagt cagacagcag caaatcagag agcgacagca gtgatagtga cagtaagtca
2041 gacagcagtg acagcaacag cagtgacagt agtgacaaca gtgatagcag cgacagcagc
2101 aatagcagta acagcagtga tagtagtgac agcagtgata gcagtgacag cagcagtagc
2161 agtgacagca gcagtagcag tgacagcagc aacagcagtg atagtagtga cagtagtgac
2221 agcagcaata gcagtgagag cagtgatagt agtgacagca gtgatagtga cagcagtgat
2281 agtagtgaca gcagtaatag taacagcagc gatagtgaca gcagcaacag cagcgatagc
2341 agtgacagca gtgatagcag tgacagcagc aacagcagtg acagtagcga tagcagtgac
2401 agcagcaaca gcagtgacag cagtgatagc agtgacagca gtgatagtag tgacagcagc
2461 aacagcagtg atagcaacga cagcagcaat agcagtgaca gcagtgatag cagcaacagc
2521 agtgatagca gcaacagcag tgatagcagt gatagcagtg acagcagtga tagcgacagc
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2641 agcagcgaca gcagcgatag cagtgacagc agtgatagcg acagcagcaa tagaagtgac
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3001 aatagcggtg acagcagcaa cagcagtgac agcagtgata gcaatagcag cgacagcagt
3061 gacagcagca acagcagcga tagcagtgac agcagtgata gcagtgacag cagtgacagc
3121 agtgatagca gcaacagcag tgatagcagt gacagcagtg acagcagtga tagcagtaat
3181 agtagtgaca gcagcaacag cagtgacagc agcgatagca gtgacagcag cgatagcagt
3241 gacagcagtg acagcagcaa tagcagtgac agcagtgaca gcagcgacag cagtgatagc
```

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3301 agtgacagca gtggcagcag cgacagcagt gatagcagtg acagcagtga tagcagcgat
3361 agcagtgaca gcagcgacag cagtgacagc agtgacagca gtgaaagcag cgacagcagc
3421 gatagcagcg acagcagtga cagcagcgac agcagtgaca gcagcgatag cagcgacagc
3481 agcgacagca gcgatagcag tgacagcagc aatagcagtg atagcagcga cagcagtgat
3541 agcagtgaca gcagcgacag cagcgatagc agcgacagca gtgatagtag tgatagcagt
3601 gacagcagtg acagcagcga cagcagtgac agcagcgaca gcagtgacag cagcgacagc
3661 agtgacagca atgaaagcag cgacagcagt gacagcagcg atagcagtga cagcagcaac
3721 agcagtgaca gcagcgacag cagtgatagc agtgacagca catctgacag caatgatgag
3781 agtgacagcc agagcaagtc tggtaacggt aacaacaatg gaagtgacag tgacagtgac
3841 agtgaaggca gtgacagtaa ccactcaacc agtgatgatt agaacaaaag aaaaacccat
3901 aagattcctt ttgtgaaaag tttggtaatg ggataggaaa aaaagatttc caagaaagta
3961 aagaaagggg agaaataaac ataagacgta tgtaaacaaa aacaactggg ggaatcaaat
4021 caaacagttg gattcagaac caagacctaa ctcctgcaga gacagactct gaatgcatga
4081 cctttggtac atgcctgtta atattcatgt tctgaaaata ttttgttaaa agtgtaaatc
4141 taaacataaa agaacaatta aaatattctt taatacttca cacagaa
```

**SEQ ID NO: 9**
**Amino acid sequence of BMP-2**
**GenBank Accession Number: NP_001191**

```
   1 mvagtrclla lllpqvllgg aaglvpelgr rkfaaassgr pssqpsdevl sefelrllsm
  61 fglkqrptps rdavvppyml dlyrrhsgqp gspapdhrle raasrantvr sfhheeslee
 121 lpetsgkttr rfffnlssip teefitsael qvfreqmqda lgnnssfhhr iniyeiikpa
 181 tanskfpvtr lldtrlvnqn asrwesfdvt pavmrwtaqg hanhgfvvev ahleekqgvs
 241 krhvrisrsl hqdehswsqi rpllvtfghd gkghplhkre krqakhkqrk rlkssckrhp
 301 lyvdfsdvgw ndwivappgy hafychgecp fpladhlnst nhaivqtlvn svnskipkac
 361 cvptelsais mlyldenekv vlknyqdmvv egcgcr
```

**SEQ ID NO: 10**
**Nucleotide sequence of human BMP-2**
**GenBank Accession number NM_001200**

```
   1 ggggacttct tgaacttgca gggagaataa cttgcgcacc ccactttgcg ccggtgcctt
  61 tgccccagcg gagcctgctt cgccatctcc gagccccacc gcccctccac tcctcggcct
 121 tgcccgacac tgagacgctg ttcccagcgt gaaaagagag actgcgcggc cggcacccgg
 181 gagaaggagg aggcaaagaa aaggaacgga cattcggtcc ttgcgccagg tcctttgacc
 241 agagtttttc catgtggacg ctctttcaat ggacgtgtcc ccgcgtgctt cttagacgga
 301 ctgcggtctc ctaaaggtcg accatggtgg ccgggacccg ctgtcttcta gcgttgctgc
 361 ttccccaggt cctcctgggc ggcgcggctg gcctcgttcc ggagctgggc cgcaggaagt
 421 tcgcggcggc gtcgtcgggc cgcccctcat cccagccctc tgacgaggtc ctgagcgagt
 481 tcgagttgcg gctgctcagc atgttcggcc tgaaacagag acccaccccc agcagggacg
 541 ccgtggtgcc cccctacatg ctagacctgt atcgcaggca ctcaggtcag ccgggctcac
 601 ccgccccaga ccaccggttg gagagggcag ccagccgagc caacactgtg cgcagcttcc
 661 accatgaaga atctttggaa gaactaccag aaacgagtgg gaaaacaacc cggagattct
 721 tctttaattt aagttctatc cccacggagg agtttatcac ctcagcagag cttcaggttt
 781 tccgagaaca gatgcaagat gctttaggaa acaatagcag tttccatcac cgaattaata
 841 tttatgaaat cataaaacct gcaacagcca actcgaaatt ccccgtgacc agacttttgg
 901 acaccaggtt ggtgaatcag aatgcaagca ggtgggaaag ttttgatgtc acccccgctg
 961 tgatgcggtg gactgcacag ggacacgcca accatggatt cgtggtggaa gtggcccact
1021 tggaggagaa acaaggtgtc tccaagagac atgttaggat aagcaggtct ttgcaccaag
```

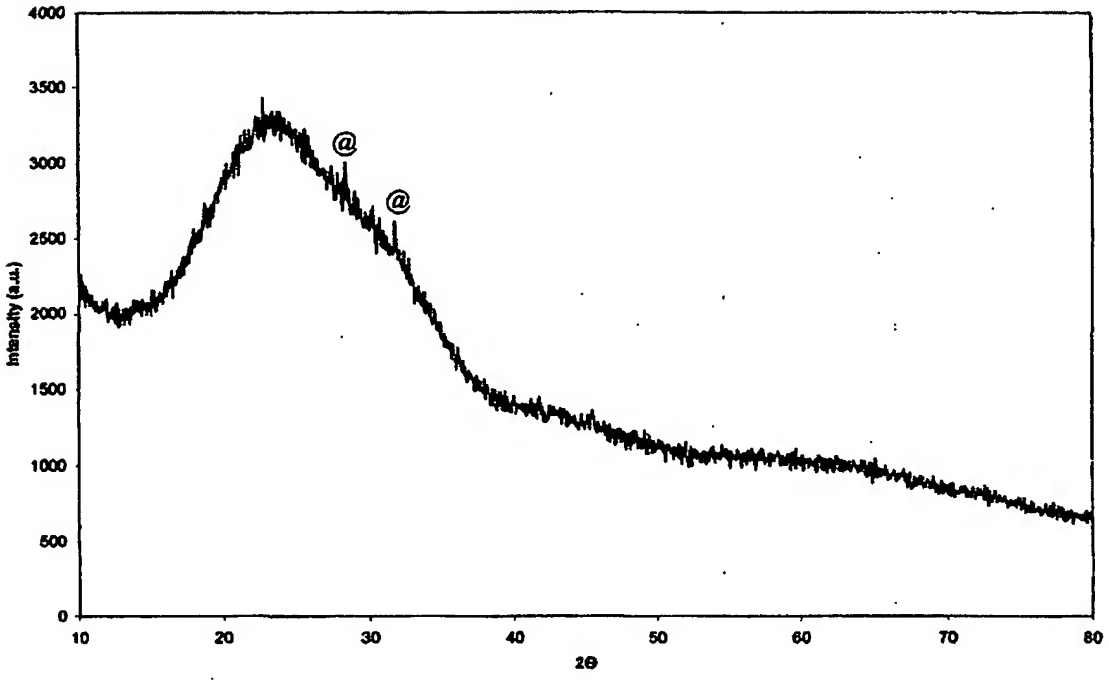
```
1081 atgaacacag ctggtcacag ataaggccat tgctagtaac ttttggccat gatggaaaag
1141 ggcatcctct ccacaaaaga gaaaaacgtc aagccaaaca caaacagcgg aaacgcctta
1201 agtccagctg taagagacac cctttgtacg tggacttcag tgacgtgggg tggaatgact
1261 ggattgtggc tcccccgggg tatcacgcct tttactgcca cggagaatgc ccttttcctc
1321 tggctgatca tctgaactcc actaatcatg ccattgttca gacgttggtc aactctgtta
1381 actctaagat tcctaaggca tgctgtgtcc cgacagaact cagtgctatc tcgatgctgt
1441 accttgacga gaatgaaaag gttgtattaa agaactatca ggacatggtt gtggagggtt
1501 gtgggtgtcg ctagtacagc aaaattaaat acataaatat atatata
```

**SEQ ID NO: 11**
GGATGGAGCTGTATCATCCTCTTCTTGGTAGCAACAGCTACA

**SEQ ID NO: 12**
CTAATGTCGACATGGAGAGTGGCAGCCGTGGAGA

**SEQ ID NO: 13**
GCATTCTAGATTAAAGCACCCGCCATTCAAATCG

**FIGURE 17**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3500
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2500
2000
1500
1000
500
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Intensity (a.u.)
@
@
10
20
30
40
50
60
70
80
2Θ

**FIGURE 18**

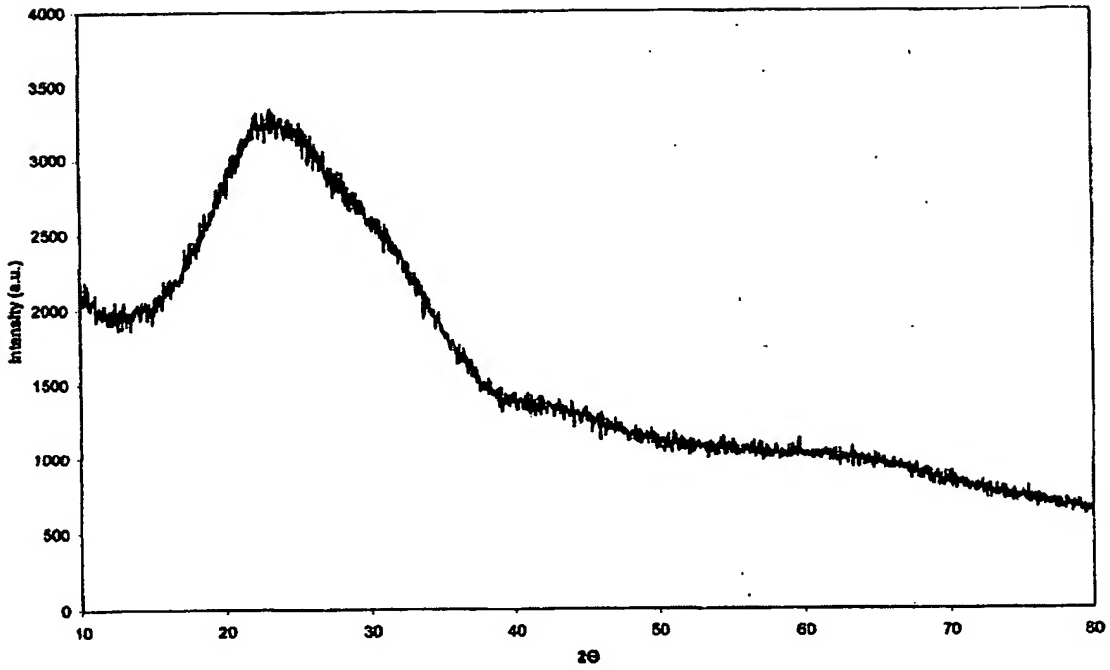

4000
3500
3000
2500
2000
1500
1000
500
0
Intensity (a.u.)
10
20
30
40
50
60
70
80
2Θ

**FIGURE 19**

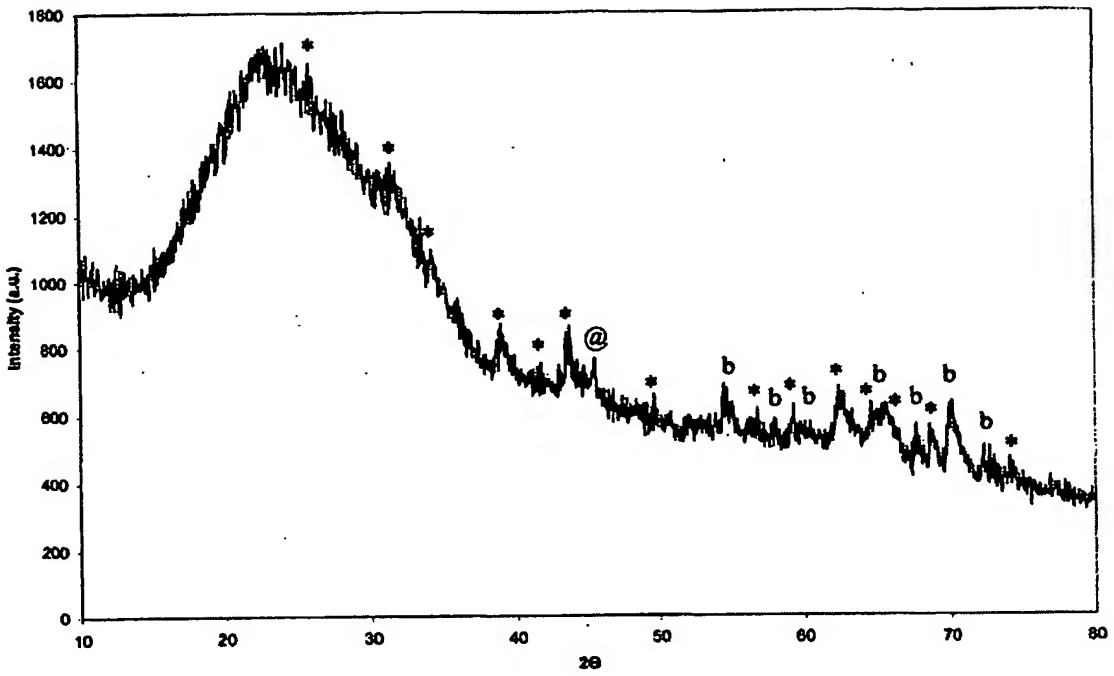

Intensity (a.u.)
2θ
1600
1400
1200
1000
800
600
400
200
0
10
20
30
40
50
60
70
80
@
b

**FIGURE 20**

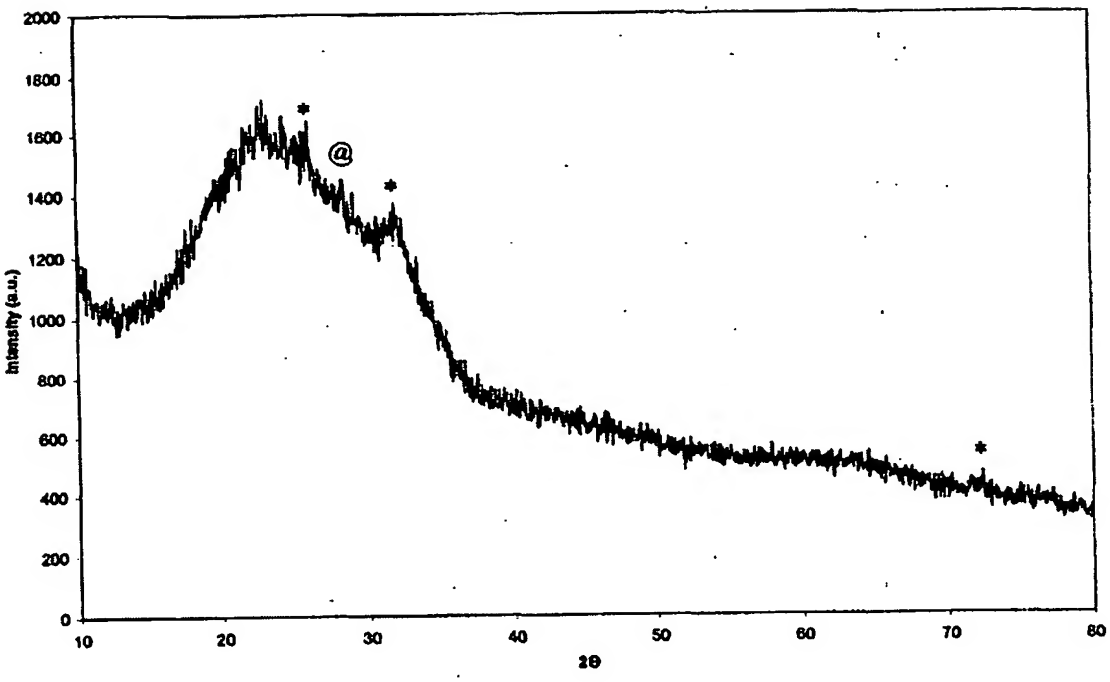
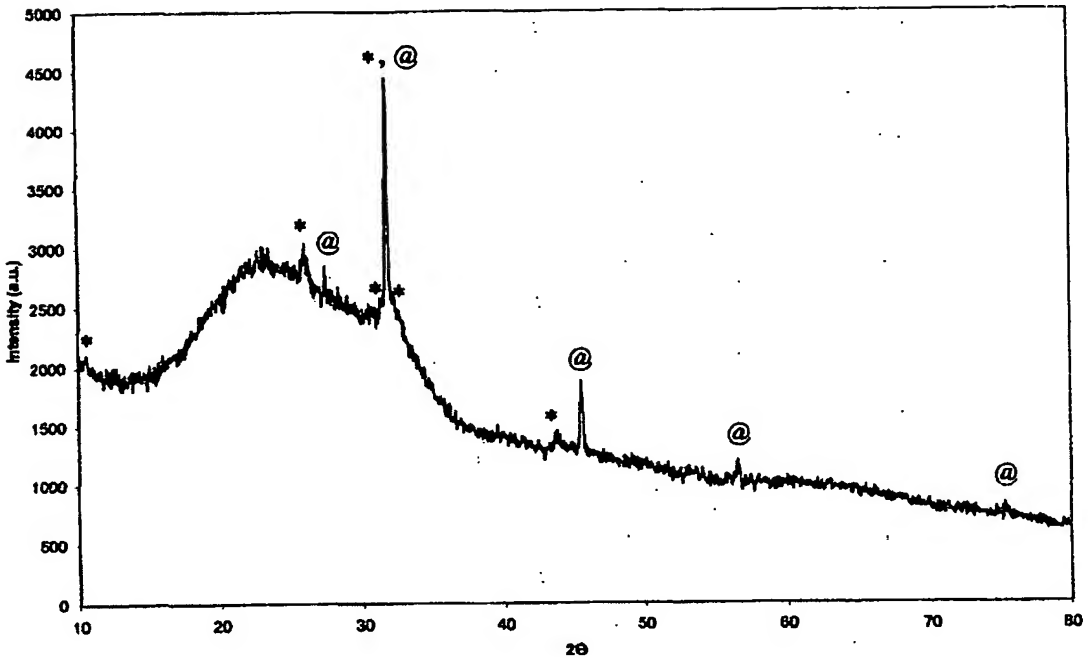

2000
1800
1600
1400
1200
1000
800
600
400
200
0
Intensity (a.u.)
10
20
30
40
50
60
70
80
2θ
@
*
*
*

**FIGURE 21**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4500
4000
3500
3000
2500
2000
1500
1000
500
0
Intensity (a.u.)
10
20
30
40
50
60
70
80
2θ
*, @
*
@
*
@
*
@

FIGURE 22

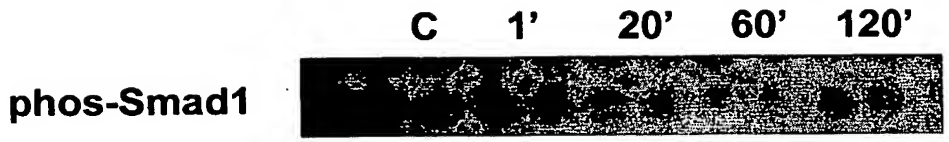
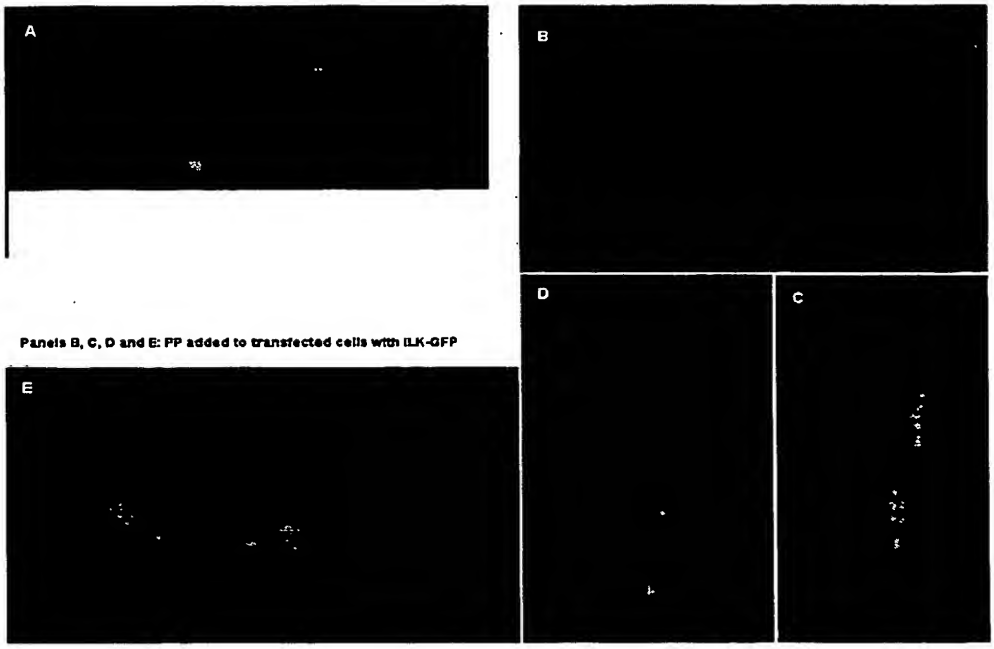


**FIGURE 23**


A
B
D
C
Panels B, C, D and E: FP added to transfected cells with ILK-GFP
E